Volunteer Lake Assessment Program Individual Lake Reports

CAPTAIN POND, SALEM, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	960	**Max. Depth (m):**	8.6	**Flushing Rate (yr^{-1})**	2.1
Surface Area (Ac.):	90	**Mean Depth (m):**	2.5	**P Retention Coef:**	0.65
Shore Length (m):	2,600	**Volume (m^3):**	874,000	**Elevation (ft):**	156

TROPHIC CLASSIFICATION

Year	Trophic class
1987	MESOTROPHIC
2002	MESOTROPHIC

KNOWN EXOTIC SPECIES

Variable Milfoil

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

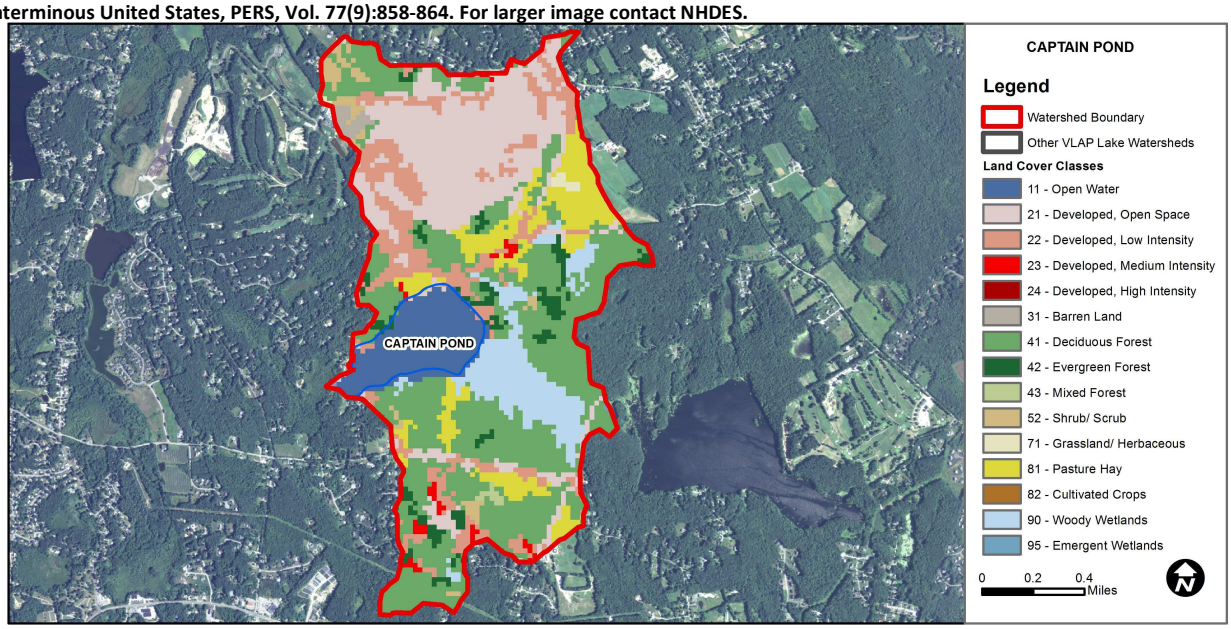
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Slightly Bad	The calculated median is from 5 or more samples and is > indicator and the chlorophyll a indicator is exceeded.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Oxygen, Dissolved	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Dissolved oxygen satura	Slightly Bad	There are >10% of samples (minimum of 2), exceeding criteria.
	Chlorophyll-a	Slightly Bad	The calculated median is from 5 or more samples and is > indicator.
Primary Contact Recreation	Escherichia coli	Good	There are geometric means and all geometric means are < geometric mean criteria; and there has been a single sample exceedance.
	Chlorophyll-a	Good	There are at least 10 samples with one, but < 10% of samples, exceeding indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

CAPTAIN POND - GIRLS INC OF HAVERHILL BEACH	Escherichia coli	Cautionary	There are no geometric means and there is one single sample exceedance. More data needed.
CAPTAIN POND - CAMP Y WOOD BEACH	Escherichia coli	Cautionary	There are no geometric means and there is one single sample exceedance. More data needed.
CAPTAIN POND - CAMP HADAR	Escherichia coli	Bad	There are >=1 exceedance(s) of the geometric mean and/or >=2 single sample criterion exceedances. One or more exceedance is >2X criteria.
CAPTAIN POND - CAMP OTTER SWIM AREA BEACH	Escherichia coli	Bad	There are >=1 exceedance(s) of the geometric mean and/or >=2 single sample criterion exceedances. One or more exceedance is >2X criteria.
CAPTAIN POND - CAPTAIN'S BEACH	Escherichia coli	Bad	There are >=1 exceedance(s) of the geometric mean and/or >=2 single sample criterion exceedances. One or more exceedance is >2X criteria.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	7.86	Barren Land	0.72	Grassland/Herbaceous	0.35
Developed-Open Space	20.9	Deciduous Forest	34.62	Pasture Hay	9.1
Developed-Low Intensity	11.8	Evergreen Forest	3.53	Cultivated Crops	0
Developed-Medium Intensity	1.09	Mixed Forest	0.25	Woody Wetlands	8.07
Developed-High Intensity	0	Shrub-Scrub	1.75	Emergent Wetlands	0.08

Volunteer Lake Assessment Program Individual Lake Reports

Captains Pond, Salem

2015 Data Summary

Recommended Actions: The pond generally experienced elevated phosphorus, chlorophyll (algal growth), conductivity, and turbidity levels in 2015. The relatively dry weather conditions and potential lack of water flushing through the pond could have contributed to these conditions as well as increased boating activity, and/or aquatic plant management activities. A significant storm event in June resulted in poor water quality conditions and is consistent with historical results following storm events. This also indicates stormwater runoff affects water quality in particular from properties directly along the shoreline. Educate lake residents on stormwater management and installing stormwater best practices on their properties to reduce stormwater runoff and erosion to the pond. DES' "N.H. Homeowner's Guide to Stormwater Management" is a great resource as well as UNH Cooperative Extension's "Landscaping at the Water's Edge". Keep up the great work!

Observations (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **Chlorophyll-a:** Chlorophyll levels were elevated in June indicating an algal bloom and then decreased slightly in August but remained within an elevated range. The 2015 average chlorophyll level increased greatly from 2014 and was much greater than the state median. Historical trend analysis indicates relatively stable chlorophyll levels with high variability between years.
- **Conductivity/Chloride:** Deep spot, Inlet, Outlet, and near shore station conductivity and chloride levels remained elevated and much greater than the state medians. Historical trend analysis indicates relatively stable epilimnetic (upper water layer) conductivity with moderate variability between years.
- **E. coli:** Boat Launch E. coli levels were very low and much less than the state standards of 406 cts/100 mL for surface waters and 88 cts/100 mL for public beaches. 7 Captains Dr. E. coli levels were slightly higher but remained below the state standard for surface waters. Buzzell Cove E. coli levels were elevated and greater than the state standard for surface waters.
- **Total Phosphorus:** Epilimnetic phosphorus levels were stable from June to August and slightly elevated however remained within an average range for that station. Average epilimnetic phosphorus levels increased slightly from 2014 and were greater than the state median. Historical trend analysis indicates stable epilimnetic phosphorus levels since monitoring began. Metalimnetic (middle water layer) phosphorus increased from average levels to elevated levels as the summer progressed. Hypolimnetic (lower water layer) phosphorus levels were greatly elevated on each sampling event and the June data were invalidated due to potential cross contamination from sediment and/or organic matter. 7 Captains Dr., Buzzell Cove, Boat Launch, and Outlet phosphorus levels were elevated in June following a significant storm event, and also in late August. Gallow, Inlet, and Camp Y Wood phosphorus levels were within average ranges for those stations.
- **Transparency:** Transparency (NVS) was relatively good in June, despite the algal bloom, decreased (worsened) slightly in early August due to wave action while sampling, and then increased (improved) slightly in late August. Average NVS transparency remained stable with 2014 but was less than (worse than) the state median. Historical trend analysis indicates relatively stable transparency with moderate variability between years. Transparency measured with the viewscope (VS) followed the same monthly pattern but was generally much higher (better) than NVS transparency and likely a better representation of actual conditions.
- **Turbidity:** Epilimnetic and metalimnetic turbidities were elevated on each sampling event likely due to algal growth. Hypolimnetic turbidity was greatly elevated in August and above average for this station. Samples were collected at a deeper depth in 2015 and are likely more representative of hypolimnetic conditions. As the summer progresses and dissolved oxygen levels are depleted in hypolimnetic waters, phosphorus can be released from bottom sediments and organic compounds are formed through chemical reactions which can cause elevated phosphorus and turbidity. Turbidity levels at all other stations were generally elevated and above average on each sampling event. The elevated algal growth, pollen, and suspended sediments from boating action could have contributed to elevated turbidity.
- **pH:** Epilimnetic, Inlet, Outlet, and near shore station pH levels were all within the desirable range 6.5-8.0 units, however metalimnetic and hypolimnetic pH levels were less than desirable and slightly acidic. Historical trend analysis indicates relatively stable epilimnetic pH with moderate variability between years.

Station Name	Table 1. 2015 Average Water Quality Data for CAPTAINS POND									
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	E. Coli #/100ml	Total P ug/l	Trans. m		Turb. ntu	pH
							NVS	VS		
Epilimnion	18.5	14.9	48	246.4		16	2.46	3.21	2.04	6.93
Metalimnion				244.8		19			2.53	6.33
Hypolimnion				293.7		129			24.8	6.25
42 Plaisted				251.0		19			6.46	6.95
7 Captains Dr.			53	249.9	160	20			2.24	7.05
Boat Launch			53	246.6	20	21			3.42	7.08
Buzzell Cove			51	246.2	610	23			2.32	7.03
Camp Y Wood			57	245.7		17			1.68	7.30
Gallow				254.4		18			1.79	7.00
Inlet			52	247.2		18			1.75	6.83
Outlet				244.2		40			2.81	6.90

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Stable	Trend not significant; data moderately variable.	Chlorophyll-a	Stable	Trend not significant; data highly variable.
pH (epilimnion)	Stable	Trend not significant; data moderately variable.	Transparency	Stable	Trend not significant; data moderately variable.
			Phosphorus (epilimnion)	Stable	Trend not significant; data show low variability.